

Application No. 09/892,482  
Reply to Office Action mailed January 11, 2005

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## **REMARKS**

### **A. SUMMARY OF THE AMENDMENTS**

The present application still contains 36 claims.

Claims 1, 3, 29, 33, 35 and 36 have been amended to provide clarification of certain features.

The two claims formerly numbered "16" have been renumbered as 16 and 17.

No new subject matter has been added by way of the present amendment.

### **B. OBJECTION TO THE CLAIMS**

On page 2 of the Office Action, the Examiner has objected to the presence of two claims numbered "16". This has been corrected in the above listing of claims, in which the previous "second" claim 16 has been renumbered as claim 17. However, no amendment to the content of the claims was necessitated by this change.

### **C. REJECTION OF CLAIMS 29, 33 and 34 UNDER 35 U.S.C. 102**

On page 2 of the Office Action, the Examiner has rejected claims 29, 33 and 34 under 35 U.S.C. 102(b) as being anticipated by Hall U.S. Patent 4,842,358 (hereinafter referred to as Hall). The Applicant respectfully traverses this rejection and submits that claims 29, 33 and 34 are in allowable form.

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Hall discloses an apparatus and method for optical signal source stabilization. Column 9, lines 34-46 of Hall (in which is included one of the passages cited by the Examiner) describes the feedback loop used to control the optical source 12:

"The outputs of the coupler 46 are input to detectors 49 and 51, which form electrical signals  $i_1$  and  $i_2$ , respectively, that are indicative of the intensities of the optical signals applied to the detectors 49 and 51. The currents  $i_1$  and  $i_2$  are then input to a differential amplifier 55. The amplified difference signal is then input to a low pass filter 56, which may comprise a series resistor (not shown) and a capacitor (not shown) connected between the resistor and ground. The output of the low pass filter 56 is designated as  $V_{LP}$ . The signal  $V_{LP}$  is then input to a voltage to current generator 57, which forms a current output  $i_F = \alpha V_{LP}$ . The current  $i_F$  is the servo current that controls the injection current applied to the SLD light source 12."

It is therefore clear that Hall's filtering operation is performed in the electrical domain, viz., after optical-to-electronic conversion has been performed on the output of the coupler 46 by the detectors 49 and 51 and the result has passed through a differential amplifier 55. In fact, it will be noticed that the control variable in Hall's feedback loop is the amplified difference in intensities of the two optical signals at the output of the coupler 46, as measured following conversion into the electrical domain. However, Hall attributes no importance whatsoever to the optical frequency content of these two optical signals. Thus, it is unsurprising that nowhere in Hall (and particularly nowhere in the portions cited by the Examiner) is there any teaching or suggestion of filtering signals in the optical domain.

Hall's general failure to discuss optical filtering of the signals used in the feedback loop leads to the inescapable conclusion that Hall fails to teach or suggest the limitations of "optically filtering the generated carrier signal to provide a first filtered optical signal and a second filtered optical signal" and "determining an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals". Thus, it will be clear that claims 29 and 33 (and 34 by virtue of its dependency on claim 33) recite at least one feature that is not taught or suggested in the cited art. Thus, a rejection under 35 U.S.C. 102 is

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Improper and the Examiner is respectfully requested to withdraw the rejection of these claims.

**D. REJECTION OF CLAIM 35 UNDER 35 U.S.C. 102**

On page 3 of the Office Action, the Examiner has rejected claim 35 under 35 U.S.C. 102(e) as being anticipated by Iida *et al.* U.S. Patent 6,643,470 (hereinafter referred to as Iida). The Applicant respectfully traverses this rejection and submits that claim 35 is in allowable form.

Iida discloses an FM signal converter, FM signal optical transmitter and FM signal optical receiver. Fig. 1 and the accompanying text (including the text in column 2, lines 49-67 that was cited by the Examiner) are quite clear: all processing operations performed in the FM signal converter are in the electrical domain (also refer to location of semiconductor laser 21 in Fig. 1). Thus, the Applicant fails to understand what may have led the Examiner to conclude that Iida's FM signal converter discloses the various limitations of claim 35, and specifically those underlined in the following:

Apparatus for stabilizing an optical carrier frequency of a generated carrier signal with respect to a target carrier frequency, comprising:

a detection module adapted to receive a first filtered optical signal and a second filtered optical signal, each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel center frequency, said detection module further adapted to determine an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals; and

a control module for adjusting the optical carrier frequency of the generated carrier signal as a function of the difference in the indication of a characteristic of the target carrier frequency in the first and second filtered optical signals.

Not only is "adjusting the optical carrier frequency" not performed in the FM signal converter of Iida (contrary to the Examiner's contention), but upon the

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Applicant's full and complete review of this reference, the Applicant has not been able to find *any* teaching or suggestion of *any* of the above limitations *anywhere* in lida. In Applicant's respectful opinion, lida is devoid of producing filtered optical signals, let alone filtered optical signals that are processed in accordance with the claimed limitations.

Since claim 35 recites at least one feature that is not taught or suggested in the cited art, a rejection under 35 U.S.C. 102 is improper and thus the Examiner is respectfully requested to withdraw the rejection of this claim.

**E. REJECTION OF CLAIMS 1-10, 12-17, 21-23 and 26-28 UNDER 35 U.S.C. 103**

On page 4 of the Office Action, the Examiner has rejected claims 1-10, 12-17, 21-23 and 26-28 under 35 U.S.C. 103(a) as being unpatentable over lida *et al.* U.S. Patent 6,643,470 (hereinafter referred to as lida) in view of Fuse U.S. Patent 6,532,099 (hereinafter referred to as Fuse). The Applicant respectfully traverses this rejection and submits that claims 1-10, 12-17, 21-23 and 26-28 are in allowable form.

**Claim 1**

Firstly, without agreeing with the Examiner's characterization of what lida positively teaches, the Applicant does accept the Examiner's concession that lida fails to disclose "a multi-channel optical filter for filtering the generated carrier signal, each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a respective channel center frequency." The Examiner appears to have resorted to Fuse in an attempt to find this "missing limitation".

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Fuse discloses an optical communication apparatus. As summarized in column 12, lines 42-49 of Fuse, "In the optical spectrum of the optical signal modulated with the RF modulated signal, switching of the transmission routes is carried out based first on the optical wavelength, and then on the RF modulating frequency." To this end (see Fig. 1), Fuse uses an optical router 105 to perform the optical switching and a set of "RF optical routers" 1071, 1072 to perform the switching based on RF modulating frequency. It will be noted that each of the RF optical routers is uniquely associated with a single optical wavelength (e.g.,  $\lambda_1$ ,  $\lambda_2$ ).

Now, the Examiner has cited a passage from Fuse (column 4, lines 40-45) which describes one of these RF optical routers, which is shown in greater detail in Fig. 5 and is accompanied by a more detailed description in column 10, line 60 to column 11, line 26. Specifically, "the first optical filter 5011 passes only the optical carrier component and double sideband components of the RF modulated signal  $S_k$  for output from a first output terminal 50011 of the RF optical router 5001. [...] Similarly, the second optical filter 5012 passes only the optical carrier component and double sideband components of the RF modulated signal  $S_j$  for output from a second output terminal 50012 of the RF optical router 5001."

Thus, it is abundantly clear that the first and second optical filters in the RF optical router of Fuse have respective passbands that are necessarily centered about the same optical carrier frequency. This is in contrast to the claimed limitation of "each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel center frequency". The Applicant further submits that addition of the word "different" by the present amendment, although descriptive and helpful, was not crucial to distinguish the expression "respective channel center frequency" from the cited art.

In view of the above, it is Applicant's respectful submission that there is at least one limitation of claim 1 that is neither taught nor suggested in the cited art, and

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thus there is at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) which has not been satisfied<sup>1</sup>. The Examiner is therefore respectfully requested to withdraw the rejection of claim 1, which is believed to be in condition for allowance.

In addition and notwithstanding the above, neither Iida nor Fuse is even remotely concerned with stabilizing an optical carrier frequency of a generated carrier signal. This basic and fundamental distinction leads to the unsurprising conclusion that neither Iida nor Fuse teaches or suggests "adjusting the optical carrier frequency of the generated carrier signal". The Examiner appears to have overlooked this basic and fundamental distinction, which leaves the rejection under 35 U.S.C. 103 fatally flawed.

#### Claim 2

Claim 2 is dependent on claim 1 and therefore includes all the limitations of claim 1, including those already shown to be absent from the cited art. Therefore, for the same reasons as those set forth in support of claim 1, it is respectfully submitted that claim 2 is in allowable form and the Examiner is respectfully requested to withdraw the rejection of claim 2.

#### Claim 3

Again, without agreeing with the Examiner's characterization of what Iida positively teaches, the Applicant does nevertheless accept the Examiner's concession that Iida fails to disclose "a multi-channel optical filter having a filter input port connected to the optical source and having a plurality of filter output

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<sup>1</sup> For the Examiner to establish a *prima facie* case of obviousness, three criteria must be considered: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings, (2) there must be a reasonable expectation of success, and (3) the prior art references must teach or suggest all of the claim limitations. MPEP §§ 706.02(j), 2142 (8<sup>th</sup> ed.).

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ports, each filter output port being associated with a respective optical channel having a pass band surrounding a respective channel center frequency." The Examiner appears to have resorted to Fuse in an attempt to find this "missing limitation".

As already discussed herein above with respect to claim 1, Fuse's optical filters have respective passbands that are necessarily centered about the same optical carrier frequency. This is in contrast to the claimed limitation of "each filter output port being associated with a respective optical channel having a pass band surrounding a different respective channel center frequency". The Applicant further submits that addition of the word "different" by the present amendment, although descriptive and helpful, was not crucial to distinguish the expression "respective channel center frequency" from the cited art.

In view of the above, it is Applicant's respectful submission that there is at least one limitation of claim 3 that is neither taught nor suggested in the cited art, and thus there is at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) which has not been satisfied. The Examiner is therefore respectfully requested to withdraw the rejection of claim 3, which is believed to be in condition for allowance.

Finally, notwithstanding the above, neither Iida nor Fuse is even remotely concerned with stabilizing an optical carrier frequency of a generated carrier signal. This basic and fundamental distinction leads to the unsurprising conclusion that neither Iida nor Fuse teaches or suggests adjusting the carrier frequency of a carrier signal in an optical signal by use of a "frequency control signal" generated by a control unit. The Examiner appears to have overlooked this basic and fundamental distinction, which leaves the rejection under 35 U.S.C. 103 fatally flawed.

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**Claims 4-10, 12-17, 21-23 and 26-28**

Claims 4-10, 12-17, 21-23 and 26-28 are dependent either directly or indirectly on claim 3 and therefore include all the limitations of claim 3, including those already shown to be absent from the cited art. Therefore, for the same reasons as those set forth in support of claim 3, it is respectfully submitted that claims 4-10, 12-17, 21-23 and 26-28 are in allowable form and the Examiner is respectfully requested to withdraw the rejection of claims 4-10, 12-17, 21-23 and 26-28.

**F. REJECTION OF CLAIMS 11, 18-20 and 24-25 UNDER 35 U.S.C. 103**

On page 13 of the Office Action, the Examiner has rejected claims 11, 18-20 and 24-25 under 35 U.S.C. 103(a) as being unpatentable over Iida *et al.* U.S. Patent 6,643,470 (hereinafter referred to as Iida) in view of Fuse U.S. Patent 6,532,099 (hereinafter referred to as Fuse) in further view of Hall U.S. Patent 4,842,358 (hereinafter referred to as Hall). The Applicant respectfully traverses this rejection and submits that claims 11, 18-20 and 24-25 are in allowable form.

It is noted that claims 11, 18-20 and 24-25 are all dependent on claim 3, and therefore include all the limitations of claim 3, including those already found to be absent from Iida and Fuse (*see section E of this response*). Specifically, it was argued that both Iida and Fuse lack any teaching or suggestion of "each filter output port being associated with a respective optical channel having a pass band surrounding a different respective channel center frequency".

It is respectfully submitted that the above-mentioned limitation of claim 3 is also missing from Hall. Specifically, as previously mentioned (*see section C of this response*), Hall's filtering operation is performed strictly in the electrical domain. Hall's general lack of concern for optical frequency content therefore makes it impossible for Hall to disclose filter output ports associated with optical channels



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each "having a pass band surrounding a different respective channel center frequency."

Thus, it will be clear that claims 11, 18-20 and 24-25 exhibit at least one feature that is not taught or suggested in any of the cited references. Thus, there is at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) which has not been satisfied and the Examiner is therefore respectfully requested to withdraw the rejection of claims 11, 18-20 and 24-25.

#### **G. REJECTION OF CLAIM 30 UNDER 35 U.S.C. 103**

On page 15 of the Office Action, the Examiner has rejected claim 30 under 35 U.S.C. 103(a) as being unpatentable over Hall U.S. Patent 4,842,358 (hereinafter referred to as Hall) in view of Fuse U.S. Patent 6,532,099 (hereinafter referred to as Fuse). The Applicant respectfully traverses this rejection and submits that claim 30 is in allowable form.

Firstly, it is noted that claim 30 is dependent on claim 29 and therefore includes all of the limitations of claim 29, including those already found to be missing from Hall (*see section C of this response*). Specifically, it has been argued that Hall lacks any teaching of "optically filtering the generated carrier signal to provide a first filtered optical signal and a second filtered optical signal" and "determining an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals".

Moreover, the fact that Hall fails to disclose first and second filtered optical signals leads to the unsurprising observation that Hall fails to disclose specific optical properties of the first and second filtered optical signals, namely "each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel frequency".

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It is respectfully submitted that this limitation of claim 29 is also absent from Fuse. Specifically, as already pointed out (*see section E of this response*), Fuse's optical filters have respective passbands that are necessarily centered about the same optical carrier frequency. This is in contrast to the claimed limitation of "each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel frequency".

Thus, it will be clear that claim 30 exhibits at least one feature that is not taught or suggested in any of the cited references. Thus, there is at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) which has not been satisfied and the Examiner is therefore respectfully requested to withdraw the rejection of claim 30.

#### **H. REJECTION OF CLAIMS 31 and 32 UNDER 35 U.S.C. 103**

On page 16 of the Office Action, the Examiner has rejected claims 31 and 32 under 35 U.S.C. 103(a) as being unpatentable over Hall U.S. Patent 4,842,358 (hereinafter referred to as Hall) in view of Fuse U.S. Patent 6,532,099 (hereinafter referred to as Fuse) in further view of Iida *et al.* U.S. Patent 6,643,470 (hereinafter referred to as Iida). The Applicant respectfully traverses this rejection and submits that claims 31 and 32 are in allowable form.

Firstly, it is noted that claims 31 and 32 are dependent on claim 29 and therefore includes all of the limitations of claim 29, including those already found to be missing from Hall and Fuse (*see section G of this response*). Specifically, it has been argued that Hall and Fuse both lack any teaching of "each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel frequency".

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It is respectfully submitted that this limitation of claims 31 and 32 is also absent from lida. Specifically, with reference to pages 4-5 of the Office Action and Section E of this response, the Applicant notes the Examiner's concession that lida fails to disclose "a multi-channel optical filter for filtering the generated carrier signal, each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a respective channel center frequency." In fact, a detailed review of lida by the Applicant shows no sign of "filtered optical signals" in lida, and thus it is concluded that lida joins Fuse and Hall in failing to teach or suggest "each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel frequency".

Thus, it will be clear that claims 31 and 32 exhibit at least one feature that is not taught or suggested in any of the cited references. Thus, there is at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) which has not been satisfied and the Examiner is therefore respectfully requested to withdraw the rejection of claims 31 and 32.

#### **I. REJECTION OF CLAIM 36 UNDER 35 U.S.C. 103**

On page 17 of the Office Action, the Examiner has rejected claims 31 and 32 under 35 U.S.C. 103(a) as being unpatentable over Hall U.S. Patent 4,842,358 (hereinafter referred to as Hall) in view of Miyazaki *et al.* U.S. Patent 5,387,992 (hereinafter referred to as Miyazaki). The Applicant respectfully traverses this rejection and submits that claim 35 is in allowable form.

Firstly, as argued in section C of this response, Hall lacks any teaching of "optically filtering the generated carrier signal to provide a first filtered optical signal and a second filtered optical signal" and "determining an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals". This argument applies equally in support of the present claim,

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which recites "first and second optically filtered versions of the generated carrier signal". Simply put, nowhere in Hall are there plural optically filtered versions of the generated carrier signal.

Moreover, in the same spirit as the argument presented in section G of this response, the fact that Hall fails to disclose optically filtered signals leads to the unsurprising observation that Hall fails to disclose specific optical properties of the first and second filtered optical signals, namely "each version including a portion of the generated carrier signal contained in a pass band surrounding a respective channel frequency".

It is respectfully submitted that these limitations of claim 36 are also absent from Miyazaki. Specifically, Miyazaki provides an optical frequency multiplex carrier control system. However, nowhere in Miyazaki is there provided first and second optically filtered versions of a generated carrier signal. It thus comes as no surprise that Miyazaki will be deficient in disclosing that such signals include a portion of the generated carrier signal contained in a pass band surrounding a respective channel frequency.

Thus, it will be clear that claim 36 exhibits at least one feature that is not taught or suggested in any of the cited references. Thus, there is at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) which has not been satisfied and the Examiner is therefore respectfully requested to withdraw the rejection of claim 36.

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#### IV. CONCLUSION

In view of the foregoing, Applicant is of the view that claims 1-36 are in allowable form. Favourable reconsideration is requested. Early allowance of the Application is earnestly solicited.

If the application is not considered to be in full condition for allowance, for any reason, the Applicant respectfully requests the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims pursuant to MPEP 707.07(j) or in making constructive suggestions pursuant to MPEP 706.03 so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,

  
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